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OFFICE OF AVIATION POLICY AND PLANS

PRELIMINARY REGULATORY EVALUATION, INITIAL REGULATORY FLEXIBILITY DETERMINATION, AND TRADE IMPACT ASSESSMENT

PROPOSED RULE

TYPE CERTIFICATION PROCEDURES FOR CHANGED PRODUCTS

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EXECUTIVE SUMMARY

This regulatory evaluation examines the impacts of a proposed rule to amend parts 11, 21, and 25 of Title 14 of the Code of Federal Regulations (14 CFR). The proposed rule would alter the procedural requirements for the certification of changes to type certificated products. To the extent practical, the proposal would require use of the latest airworthiness standards applicable to those areas of the product affected by a change.

The proposal would permit the applicant to comply with the applicable regulations incorporated by reference in the original type certificate where compliance with later regulations would either be impractical or would not contribute materially to the level of safety. Compliance with later amendments would be considered impractical if the applicant could show that it would result in costs that are not consistent with the possible safety benefits. Although the attributable costs and benefits of the proposed rule cannot be quantified, the FAA holds that the proposed rule would be cost beneficial.

The proposed amendments would not have a significant economic impact on a substantial number of small entities. In addition, the proposed rule would not constitute a barrier to international trade. The proposed procedures have been harmonized with those of foreign aviation authorities.

TYPE CERTIFICATION PROCEDURES FOR CHANGED PRODUCTS

I. Introduction

This regulatory evaluation examines the impacts of a proposed rule to amend parts 11, 21, and 25 of Title 14 of the Code of Federal Regulations (14 CFR). The proposed rule would alter the procedural requirements for the certification of changes to type certificated products. To the extent practical, the proposal would require use of the latest airworthiness standards applicable to those areas of the product affected by a change. The proposed rule would apply to the certification of certain design changes in aircraft, aircraft engines, and propellers. It would affect the manufacturers, modifiers, and operators of these changed products.

II. Background

The Federal Aviation Act of 1958 authorizes the FAA Administrator to promote safety of flight of civil aircraft in air commerce by prescribing and revising minimum standards governing the design and construction of aircraft, aircraft engines, and propellers. Under the authority of section 603 of the Act, the FAA issues type certificates for these products. The FAA may prescribe the duration of the certificate and such terms, conditions, and limitations as may be required in the interest of safety.

The general certification procedures for products and parts are prescribed in part 21 of 14 CFR. As set forth in §§ 21.13 and 21.15, any person may submit an application and the necessary supporting documentation for a type certificate. Sections 21.16 through 21.21, 21.101, and 21.115 establish the applicable

airworthiness standards for type certification of both new and changed products. Section 21.17 designates the applicable standards for the issuance of type certificates. In order to be issued a type certificate, the applicant must show that the product complies with the applicable airworthiness requirements of 14 CFR: (1) part 23 for normal, utility, acrobatic, and commuter category airplanes; (2) part 25 for transport category airplanes; (3) part 27 for normal category rotorcraft; (4) part 29 for transport category rotorcraft; (5) part 31 for manned free balloons; (6) part 33 for aircraft engines; (7) part 35 for propellers; and (8) § 21.17(b) and (f) for special classes of aircraft and primary category aircraft.

Airworthiness standards are amended as needed to reflect changes in technology, to correct design deficiencies, and to enhance safety. An applicant for a type certificate is required under current § 21.17 to show that the product meets the applicable airworthiness standards that are in effect on the date of application.

Part 21 also establishes the applicable airworthiness standards for changed, as compared to new, products. Section 21.19 describes the conditions whereby an applicant for type certification of a changed product must apply for a new certificate. The conditions that would warrant a new certificate have changed over time. Initially, an applicant for a changed product was required to apply for a new type certificate for changes such as an alternate engine installation. When a new type certificate was required, the applicant had to comply with the standards current at the time of the new application,

including any additional standards that had been adopted since the initial type certificate. This did not constitute an unreasonable burden, at the time, because airworthiness standards did not change frequently.

Later, more rapid changes in technology generated significant changes in the airworthiness standards over relatively short periods of time. In some instances, the differences in standards could be so great that an applicant would be discouraged from making any changes, including changes that would enhance safety. To relieve this situation, the regulations were changed to require a new type certificate only in those cases where the change was substantial.

Existing § 21.19(a) requires a new type certificate if the proposed change in design, configuration, power, power limitations, speed limitations, or weight is so extensive that a substantially complete investigation of compliance with the applicable regulations is necessary. This provision has been diversely interpreted.

III. Description of the Problem

Due to frequent changes in airworthiness standards, an applicant for an extensive change to a type certificated product under § 21.19 could be required to comply with standards that differ significantly from those for the original product. Conversely, an applicant for a change that is not determined to be extensive under § 21.19 may continue to use the airworthiness standards applicable to the original product.

Two pertinent trends have developed in recent years. First, fewer products are being introduced with a completely new design. However, over time, a series of changes to an original product may have combined to produce a current model that is substantially different from the initial model. Second, basic products are being kept in production, with incremental modifications, over longer periods of time. The current regulations do not ensure that changed products comply with the latest standards to the greatest extent practicable. Considerable differences may exist between the standards required for a new product and those for a coincident product that was incrementally developed from a previous product. These differences provoke questions of horizontal equity as well as safety.

IV. Description of the Proposed Rule

Sections 11.11, 21.19, 21.101, 21.115, and 25.2 would be amended under the proposal:

Section 11.11

To remain consistent with the proposed changes to § 21.101, § 11.11 would be amended to refer to § 21.101(c) instead of § 21.101(b)(2). This would not be a substantive change.

Section 21.19

Current § 21.19(a) states that any person who proposes to change a product must make a new application

for a type certificate if the Administrator finds that the proposed change in design, configuration, power, power limitations (engines), speed limitations (engines), or weight is so extensive that a substantially complete investigation of compliance with the applicable regulations is required. This sentence has engendered confusion because it covers several types of changes for all products: airplanes, rotorcraft, aircraft engines, and propellers. In addition, current paragraphs (b), (c), and (d) list other specific types of changes that mandate a new application for a type certificate. Only the general language of current paragraph (a) would be incorporated into the new § 21.19, while the previously listed specific changes would be subject to case-specific evaluations to determine whether they would be considered substantial.

The application of § 21.19 would depend on an evaluation of whether the proposed change in design, power, thrust, or weight would necessitate a substantially complete investigation of the compliance of the changed product. In applying the concept of "substantially complete investigation" the FAA would assess the number of airworthiness regulations of the certification basis that would be reinvestigated. Any of the following airplane design changes, considered alone, could typically be regarded as a substantial design change:

(1) Change from a high wing to a low wing airplane, or vice versa;

(2) Change of empennage configuration for larger airplanes (cruciform vs 'T' or 'V' tail);

(3) Complete repositioning of engines (tail to wing, etc.); and

(4) An increase in airplane design complexity resulting from an increase in the number of engines.

Current § 21.19(b) describes specific changes for which the applicant must apply for a new aircraft type certificate. These include (1) changes in the number of engines or rotors; and (2) changes to engines or rotors using different principles of propulsion or to rotors using different principles of operation. Invariably, these types of changes fall into one of two categories: (1) those that are not extensive enough to require a new application for a type certificate, as evidenced by the large number of exemptions that have been granted over the past quarter century, and (2) those that are so extensive that a new application would be required because a complete investigation of compliance is necessary. Accordingly, the provisions of current § 21.19(b) are not needed and would be deleted by this proposal. The exemptions that have been granted from current § 21.19(b) have typically required that those areas, systems, components, equipment, and appliances that are changed or significantly affected by the change must comply with the applicable regulations in effect on

the date of the application for that change. This requirement would be embodied in proposed § 21.101, which would generally require that an applicant for a change to a type certificate must comply with the regulations in effect on the date of the application for that change, with the exception that those areas, systems, components, equipment, and appliances not affected by significant changes could continue to comply with the regulations incorporated in the reference type certification basis. Accordingly, this proposed amendment would be consistent with the exemptions that have been granted on changes in the number of engines. The need for requiring a new application for a type certificate would be alleviated in many instances by the proposed changes to § 21.101.

Current § 21.19(c) requires that the applicant must apply for a new aircraft engine type certificate if there is a change in the principle of operation. Also, current § 21.19(d) requires that the applicant must apply for a new propeller type certificate if there are changes in the number of blades or in the principle of "pitch change" operation. Invariably, the type of changes set forth in both of these sections are so extensive that a new application would be necessary because a complete investigation of compliance would be required under proposed § 21.101.

Section 21.101

Current § 21.101(a) states that if a person applies for a change in a type certificate, the product must comply with either the regulations referenced in the type certificate or the applicable regulations in effect on the date of application for the change, if elected by the applicant, plus any other amendments the Administrator finds to be directly related.

Current paragraph (b) addresses novel or unusual design features where the Administrator finds that the regulations incorporated by reference in the type certificate do not provide adequate standards. In this case the applicant must comply with the regulations in effect on the date of the application for the change and any necessary special conditions "to provide a level of safety equal to that established by the regulations incorporated by reference in the type certificate for the product." The level of safety must be at least equal to the level of safety that was required by the regulations referenced in the type certificate.

To ensure that changed products meet the latest airworthiness standards, where practical, proposed § 21.101 would specify that, with certain exceptions, the applicant for a change must comply with the applicable regulations in effect on the date of the application for the change. The intent of this proposal is to apply the applicable regulations in effect on the date of the application to those areas, systems, components,

equipment, and appliances affected by the change. For those areas, systems, components, equipment, and appliances not affected by the change, continued compliance with the regulations incorporated by reference in the type certificate would be acceptable.

These proposed procedures would be applicable for changes to aircraft, aircraft engines, and propellers that have been type certificated under §§ 21.24, 21.25, 21.27, and 21.29 as well as § 21.21. At first glance, because some of these regulations do not depend on published airworthiness standards that are current, products type certificated under these regulations may not appear to benefit from the procedures of this proposed rulemaking. However, after careful consideration, the FAA has determined that changes to products that have been type certificated under any of these regulations would benefit from the enhanced safety associated with the appropriate later airworthiness standards. This takes into consideration that the certification basis, in some cases, may not be well defined or be up to date.

For example, surplus military aircraft type certificated in the restricted category under § 21.25 are normally accepted on the basis of the previous military qualifications acceptance and service record in lieu of showing compliance with an airworthiness standard. However, changes to these products usually are not supported by the military service history, therefore,

they must meet an appropriate airworthiness standard. Compliance with the later amended airworthiness standards would provide the associated enhanced safety, and the exceptions provided by proposed § 21.101(b) would ensure the practicality involved with the use of later amended airworthiness standards for changes to a product that never met an airworthiness standard initially.

Another example is surplus military aircraft being type certificated under § 21.27. Since that regulation was first adopted, changes have been made to 14 CFR to upgrade the level of safety required for civilian aircraft and to incorporate certification standards for modern, state of the art technology. The level of safety of changes to products type certificated under § 21.27 would benefit from compliance with the later airworthiness standards.

Limited category aircraft are surplus military aircraft, mostly from World War II, that were type certificated under Part 9 of the Civil Air Regulations for use other than air transport. These aircraft were not intended to carry persons or property for compensation or hire, and normally were accepted on the basis of their previous military qualifications acceptance and service record. Currently, alterations to these aircraft may be approved by a showing that the alteration would not detract from the satisfactory military safety record. However, changes of these products are not supported by the military service

history, therefore, they must comply with appropriate airworthiness standards. Compliance with the later amended airworthiness standards would provide the associated enhanced safety, and, with the exceptions provided by proposed § 21.101(b), would ensure the practicality involved with the use of later amended airworthiness standards for changes of a product.

Section 21.101(a)

With the exceptions noted below, this proposed paragraph would require an applicant for a change to a type certificate to comply with the applicable regulations in effect on the date of the application for the change and with parts 34 and 36.

Section 21.101(b)

This proposed paragraph would provide exceptions to the regulation in proposed paragraph (a) by permitting the applicant to comply with earlier amendments to the regulations. When choosing the amendment level of a regulation, all related regulations associated with that amendment level would have to be included. The amendment level chosen would not be allowed to predate either the existing basis or anything required by the retroactive sections, §§ 23.2, 25.2, 27.2, or 29.2.

Section 21.101(b)(1)

This proposed paragraph would provide the first exception to the regulation in proposed paragraph (a), to show compliance with the latest applicable regulations. The proposed paragraph would state that the applicant would be allowed to demonstrate compliance with earlier regulations, but not earlier than the regulations incorporated in the existing certification basis, if the effect of the proposed change is not significant, taking into account earlier design changes and previous updating of the type certification basis.

Section 21.101(b)(2)

This proposed paragraph would provide the second exception to the regulation in proposed paragraph (a), to show compliance with the latest applicable regulations. The proposed paragraph would state that the applicant may show compliance with earlier regulations for those areas, systems, components, equipment, and appliances that are not affected by the change.

The FAA recognizes that arbitrarily requiring compliance with later regulations in areas, systems, components, equipment, and appliances not affected by the change may cause redesign of components that have an acceptable service record without an attendant improvement in safety, or may have the counterproductive effect of discouraging any changes at all, including

those that would provide a significant improvement in safety.

Section 21.101(b)(3)

This proposed paragraph would provide the third exception to the regulation in proposed paragraph (a) to show compliance with the latest applicable regulations. If compliance with a regulation in effect on the date of the application for the change would be impractical, or would not contribute materially to the level of safety of the product to be changed, the applicant may demonstrate compliance with an earlier amendment of a regulation for which such compliance would be practical and would contribute materially to the level of safety of the product to be changed, provided that the amended regulation does not precede either the corresponding regulation in §§ 23.2, 25.2, 27.2, or 29.2 or the corresponding regulation incorporated by reference in the type certificate.

Section 21.101(c)

This proposed paragraph would contain the provisions of current § 21.101(b)(2) concerning special conditions. For consistency with the other proposed changes to § 21.101, this paragraph would state that an applicant for a change must comply with any special conditions, and amendments to those special conditions, if needed, that would provide a level of safety equal to that established

by the regulations in effect on the date of the application for the change. The interpretation of "novel or unusual design features" would be the same as present practice under current § 21.101(b)(2). The provisions of current § 21.101(b)(1), concerning the use of later regulations when the regulations incorporated by reference do not provide adequate standards with respect to the proposed change, would no longer be needed and would not be incorporated into the proposed regulation. Similarly, the provisions of current § 21.101(c), concerning the replacement of reciprocating engines with turbopropeller engines, are not incorporated into the proposed regulation.

Section 21.101(d)

This proposed paragraph would state that an application for a change to a type certificate for a transport category aircraft would be effective for 5 years, and an application for a change to a type certificate for all other products would be effective for 3 years. These proposed effectivity periods for an application are the same as those in current § 21.17(c) and (d) for an application for a type certificate. Because current § 21.101 requires compliance with the regulations incorporated by reference in the type certificate and because the certification basis of the original product doesn't change, having an effectivity period for an application for a design change has not

been necessary. Under the proposed § 21.101, which would require meeting the airworthiness standards in effect on the date of the application for the change, it is necessary to limit the effectivity of the application for a change, to support the intent of the proposed regulation. This proposed section would state that if an application for a design change expired, an applicant could file a new application or apply for an extension of the original application.

Section 21.115

Current § 21.115 incorporates the provisions of current § 21.101(a) and (b) by reference, making the provisions of the latter section equally applicable to applicants for supplemental type certificates. In view of the proposed changes to § 21.101, it is necessary to amend § 21.115 to refer simply to § 21.101 rather than specifically to § 21.101(a) and (b). This would not be a substantive change.

Section 25.2

Current § 25.2(c) incorporates the provisions of current §§ 21.101(a)(2) and (b) by reference, addressing the subsequent revisions to the special retroactive regulations. To remain consistent with the proposed changes to § 21.101, it is necessary to amend § 25.2(c) to refer to § 21.101(a). This would not be a substantive change.

V. Discussion of Costs and Benefits

It is emphasized that the following discussion of costs and benefits is provided because the proposed procedures would be explicitly incorporated into formal regulations. By administrative policy, the FAA is already requiring that certain changed products comply with selected amendments that were adopted after the initial application for type certification of the base product. It is likely that such administrative decisions would continue, to some unknown degree for an unknown proportion of type certificated products, in the absence of the proposed rule.

Unlike many amendments, the proposed rule would not initiate a specific certification standard or requirement per se, but instead, would formally alter the manner in which existing and future standards would be determined to be applicable. As a result, the FAA can describe but is not able to quantify the costs and benefits of the proposal. A quantification of the impacts would require a forecast of potential future changes to all commuter and transport category airplane models; all rotorcraft; and all other categories of regulated aircraft, engines, and propellers. In addition, a quantified evaluation would require a review of all applicable regulations that have been adopted during the intervening period after the type certification of the product, plus engineering appraisals of the intended changes for each product, the effects of those changes on other systems and components, and the economics associated with bringing each affected system and component up to the

standards of the intervening regulations. No reasonable estimate of these factors can be made.

In addition to the absence of a comprehensive estimate, no examples of such cost estimates are available for this evaluation. As noted above, the FAA has administratively required some manufacturers of changed products to comply with later regulations. In association with these actions, individual manufacturers of proposed changed products have evaluated the costs and benefits that would be incurred to meet the pertinent standards. Due to competitive economic considerations, however, such information is considered proprietary and is not available.

The attributable costs of this proposal are the incremental costs that would be incurred to meet any additional or more stringent standards, adopted after the application for type certification of the initial product, that would not be required in the absence of this proposal. Similarly, the direct benefit of the proposal is the augmented safety that would result from meeting such standards. Although the attributable costs and benefits cannot actually be quantified, certain safeguards have been included in the proposed rule so that any actions taken pursuant to it would be cost beneficial.

As noted in the description of the proposal, compliance with later regulations would not be required for a change that is not classified as being significant, for those areas or components not affected by the change, or where compliance with later regulations would be "impractical" or would not contribute materially to the level of safety. Compliance with later amendments would be considered impractical if the applicant could

show that such compliance would result in costs that are not consistent with the possible safety benefits.

Further guidance on the definition of what constitutes a significant change would be provided in an advisory circular. Proposed Appendix 2 of this circular would include a safety-resource procedure for evaluating the practicality of applying later rules in establishing the certification basis for a changed product. It is intended that the procedure would only be used to aid the engineering judgment of a team of technical experts in evaluating the relative merits of applying later regulatory actions. The procedure would compare a safety index to a resource index to determine whether a particular changed product should comply with later regulatory changes.

The safety index would measure: (1) the seriousness of the consequences of the hazard that the later regulations address, (2) the projected frequency of those consequences, and (3) the expected incremental effectiveness of the later standards in addressing this hazard for the changed product in question. The resource index would gauge: (1) the incremental labor and capital equipment necessary for compliance, (2) the effect on scrap parts and part interchangeability, and (3) the potential increase in operating costs or reduction in revenue or utility.

In addition to the benefits of any individual action taken pursuant to the proposed rule, the proposal would also generate procedural benefits. The formalization of this policy by regulation would expedite decisions about the certification basis of proposed changed products and, therefore, would provide manufacturers and modifiers with earlier and more dependable

information on which to base their product development decisions. In addition, the proposed procedures have been harmonized with the foreign aviation authorities of Canada and Europe and the resulting common standards would reduce the costs and delays necessary to formally determine and fulfill dissimilar international requirements.

The contention that the adoption of these formal and internationally standardized procedures would produce substantive benefits to the manufacturers, modifiers, and operators of type certificated products is supported by the fact that the proposed rule was recommended by a committee of industry experts known as the Aviation Rulemaking Advisory Committee (ARAC). This group includes representatives of foreign aviation authorities, pilot groups, airlines, aircraft manufacturers, and aircraft engine manufacturers. The proposed rule reflects the recommendations of the ARAC for type certification procedures for changed products.

Although the attributable costs and benefits of the proposed rule cannot be quantified, the FAA holds that it would be cost beneficial.

VI. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a proposed rule would have a significant economic impact, either detrimental or beneficial, on a substantial number of small entities. FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance,

establishes threshold cost values and small entity size standards for complying with RFA review requirements in FAA rulemaking actions. The proposed amendments would not have a significant economic impact on a substantial number of small entities.

VII. Trade Impact Assessment

The proposed rule would not constitute a barrier to international trade, including the export of American goods and services to foreign countries and the import of foreign goods and services into the United States. Instead, the proposed type certification procedures for changed products have been harmonized with foreign aviation authorities and would lessen the restraints on trade.